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Does capital bear the burden of local corporate taxes? Evidence from Germany

Aria Ardalan [a], Sebastian G. Kessing [a,b,*], Salmai Qari [c,d], Malte Zoubek [e]

[a] University of Siegen, Germany
[b] CESifo, Germany
[c] Berlin School of Economics and Law, Germany
[d] German Institute for Economic Research (DIW Berlin), Germany
[e] University of Kassel, Germany

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ABSTRACT

Exploiting the German 2008 tax reform we employ an event study design to assess the effects of local corporate taxes on stock prices. We match firms to the local tax rates at their respective headquarters and analyze the differential stock market responses to the reform decision. We find that firms which are located in high tax jurisdictions and therefore face a possible high tax reduction significantly outperform firms in low tax jurisdictions during the decision-making process. The results indicate that firm owners partially bear the burden of local corporate taxes.

1. Introduction

Whether capital bears the burden of local corporate taxes is still largely an open empirical question. Fuest et al. (2018) show that roughly half the burden of local corporate taxes in Germany is shifted onto workers. Jacob et al. (2022) find that gas stations in Germany partly pass-through local corporate taxes to consumer prices. Moreover, such taxes may also be shifted upwards to suppliers or land owners, which further reduces the potential for firm owners to bear the incidence of corporate taxes at the local level. From a conceptual perspective, local jurisdictions can be seen as small open economies, and several authors have argued that, based on theoretical arguments, capital should be able to eschew the burden of corporate taxes under such circumstances, cf. Harberger (2008) and Gordon (1986). The aim of the present study is to provide empirical evidence that, despite the theoretical arguments and the existing empirical results on tax burden shifting, capital owners are affected by local corporate taxes and, at least partly, bear the burden of such taxes.

We follow Fuest et al. (2018) and Jacob et al. (2022) and exploit the compelling German institutional setting with its wide variation in the local business tax (LBT) rates, but we employ a research design based on the asset price approach to incidence, cf. Summers (1985), Cutler (1988), Lang and Shackelford (2000), Johannesen and Larsen (2016), Wagner et al. (2018), Ohrn and Seegert (2019), among others. The key idea of this approach maintains that the tax incidence corresponding to a tax reform should be immediately reflected in asset prices. Following this logic we set up a financial markets event study to analyze the effects of the German 2008 corporate tax reform decision on firm valuations. We investigate, whether the existing differences in the LBT rate at firms' headquarters impacted the stock market response to the reform decision.

We find that firms located at high tax locations substantially outperformed firms based in low tax jurisdictions during the tax reform decision process. An increase in a firm's local tax rate by one percentage point implies a higher abnormal return of 0.4 percentage points during the key event month of the reform. The differential impact indicates that firm owners do, at least partly, bear the burden of local corporate taxes.

2. Background

In Germany, corporate businesses are subject to the LBT and to the federal corporate income tax. The LBT is levied on profits of firms that operate an establishment in a given municipality. Its tax base is uniformly determined at the federal level and largely corresponds to the tax base of the federal corporate income tax, but is corrected by several additions and deductions. Local governments effectively

* Correspondence to: University of Siegen, Department of Economics, 57068 Siegen, Germany.
E-mail addresses: aria.ardalan@uni-siegen.de (A. Ardalan), kessing@vwl.wiwi.uni-siegen.de (S.G. Kessing), salmai.qari@hwr.berlin.de (S. Qari), malte.zoubek@uni-kassel.de (M. Zoubek).

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determine the local tax rate at a yearly frequency. For firms that operate more than a single establishment the total tax base is apportioned to those municipalities, where at least a single establishment of the firm is located, according to the share in the total wage bill of the firm. See Fuest et al. (2018) for more institutional details on the LBT.

The 2008 corporate tax reform reduced the federal corporate tax rate and the LBT rate. The former was lowered from 25% to 15%. The tax rate change of the LBT combined a proportional across-the-board reduction with a change in deduction rules. Thus, while the actual reduction depended on the local tax rate, the combined effect resulted in a rather similar tax rate reduction across jurisdictions by construction.[1]

The reform also adjusted the tax bases. A thin capitalization rule was introduced to reduce tax base shifting to foreign countries.[2] Moreover, the determination of the LBT base from the federal corporate tax base was changed, in particular with respect to the treatment of interest payments on long and short term debt. Finally, the reform introduced the possibility to create real estate investment trusts (REITs), and allowed for tax preferred transfers of property from corporations to these vehicles.[3] For further details on the reform, see Homburg (2007).

The political reform discussion entered its decisive phase in mid-March 2007, and the reform was finalized on July 6, 2007.[4] Given the federal and corporatist structures that shape policy-making in Germany, modifications and amendments to proposed legislation are rather commonplace. For a substantial period there was uncertainty about the details and the political viability of the reform. In particular, after the government's legislation proposal on March 14, and after March 30, when the legislation was delegated to the responsible Bundestag committees, the outcome was still undetermined, see FAZ (2007a) and FAZNET (2007). By the end of April, in particular after the Public Finance Committees' hearings on April 25/26, the fog cleared, see FAZ (2007b) and FAZ (2007c). In summary, the reform was a gradual process with the decisive political steps, which determined the final outcome, occurring in April 2007.

3. Data and methodology

Our sample consists of 188 "prime standard" firms that comprise the composite German stock market index on the Frankfurt Stock Exchange, with headquarters based in 100 different municipalities.[5] The companies' daily stock prices and industry affiliations are from Datastream and account for dividend reinvestment and splits. We use market factor information by Brückner et al. (2015) and firms' headquarter locations from the Hoppenstedt and Amadeus databases. We match each firm to the LBT rate at this location. Thus, all our results correspond to differences in these headquarter LBT rates. The local tax rates are available from the Federal and States' Statistical Offices. Fig. 1 illustrates the substantial rate variation across headquarter municipalities.

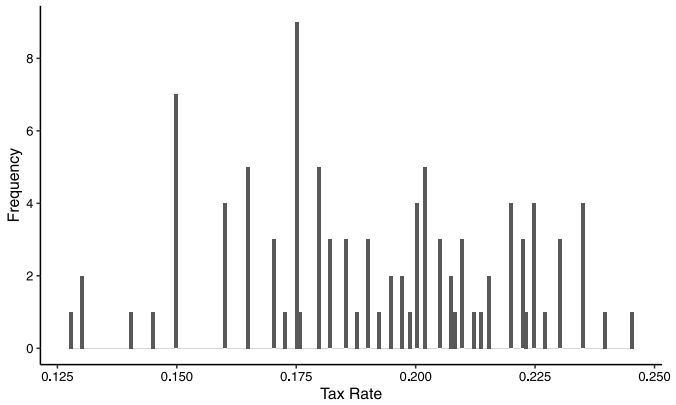


Fig. 1. Local tax rate distribution.
Notes: Distribution of the 2007 LBT rates across the 100 headquarter municipalities.

We start with an exploratory exercise and split the sample into firms with headquarters in high- and low-tax jurisdictions, respectively, taking the mean of the 2007 LBT rate as the cut-off value. We then form two unweighted portfolios and plot their cumulative returns over the reform period (relative to October 13, 2006) in Fig. 2. The cumulative returns first track each other closely, but start to diverge around mid-March 2007. The difference becomes particularly strong in late April. Around June 2007 the divergence comes to an end. Apparently, high-tax firms outperformed low-tax firms during the reform decision.

Our main analysis employs financial market event study research designs, see Ohrn and Seegert (2019), Johannesen and Larsen (2016), Wagner et al. (2018) for other incidence applications of this approach. To address the gradual reform process, we follow Asher and Novosad (2017), Chen (2007) and Wolfers (2006), among others, and use monthly abnormal returns. In line with the political decision process as described above, we use April 2007 as the event month.

We denote the rate of return of firm i at time t by $r_{it} \approx \ln(P_{it}) - \ln(P_{it-1})$, where P is the stock price. We generate abnormal returns, AR_{it}, as the difference between the actual returns, adjusted for the risk-free rate, and the predictions from a Carhart (1997) model. This

[1] The local tax rates result from the multiplication of the constant, federally determined base factor ("Steuermesszahl") with locally determined multipliers ("Hebesatz"). The reform reduced the base factor and thus the LBT rates by 30% (from 5% to 3.5%), which should have favored firms facing high local tax rates. However, until the reform, the LBT could be deducted from its own base, as well as from the base of the federal corporate tax. These deductions were scrapped by the reform, which should have harmed firms in high tax jurisdictions relatively more.

[2] This rule set a cap on tax deductions of paid interest of 30% of the earnings before interest, taxes, depreciation and amortization (EBITDA) for the LBT and the federal corporate tax.

[3] The introduction of REITs followed their previous introduction in other European countries, in particular in France, where these vehicles had become popular among investors. While not directly part of the tax reform legislation, the corresponding legislation was largely discussed in the context of the reform discussion. Moreover, the REIT legislation was voted on the same day as the other elements of the tax reform.

[4] The chronological sequence of the key political steps was as follows: On February 1, 2007 the joint working party of the state and federal governments agreed on a draft legislation. On March 14 the government proposed the legislation to the parliament. After the first reading on March 30, the Bundestag (first chamber) delegated it to the responsible committees for deliberations. On April 25, the Bundestag's Public Finance Committee publicly discussed the draft. The Bundesrat's (second chamber) Public Finance Committee meeting on April 26 made clear that the Bundesrat would not ask for major changes. The Bundestag passed the reform on May 25, the Bundesrat on July 6.

[5] The limited number of firms in our sample stems from several reasons. First, the German stock market is rather underdeveloped relative to the size of the economy. This is due to the prevalence of privately held, medium-sized companies which form the backbone of the German economy, and the traditional reliance on debt financing. Second, the prime standard we are using was a newly established quality standard after the bursting of the dotcom bubble in 2000, which, in the German capital market, materialized through the collapse of the "Neuer Markt" (New Market). The prime standard, which required firms to fulfill key transparency and reporting standards, was only introduced in 2003 as a response to re-establish trust in the stock market. Moreover, from the prime standard firms we only use German firms, and we only use common stocks for those firms where preferred and common stocks are listed in the prime standard. Finally, issues of data completeness further restrict our sample of firms, since we estimate our market models (see below) over the same period for all firms. Our results should be interpreted in light of these data restrictions.

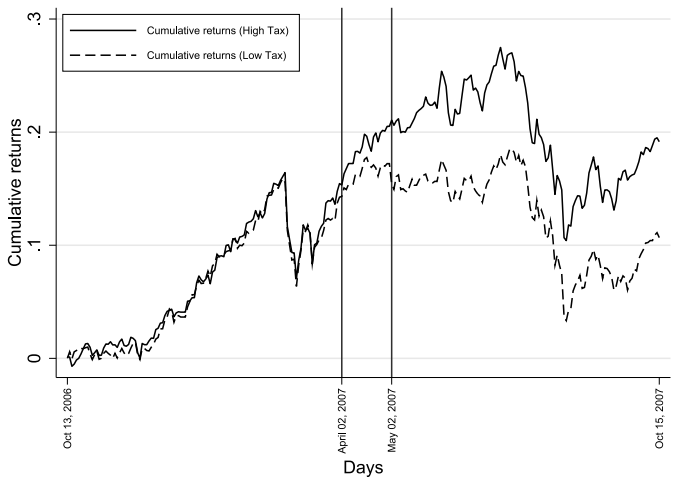


Fig. 2. Cumulative returns of high and low tax portfolios
Notes: Cumulative portfolio returns from October 13, 2006 until October 15, 2007. Vertical lines correspond to the first trading days in April and May.

specification follows Artmann et al. (2012) who demonstrate that simple CAPM or Fama–French three factor specifications do a poor job to explain average stock returns in Germany, whereas the encompassing Carhart specification does much better. For each firm i we estimate:

$$r_{it} - r_t^f = \alpha_i + \beta_i^1[r_t^m - r_t^f] + \beta_i^2 SMB_t + \beta_i^3 HML_t + \beta_i^4 WML_t + \varepsilon_{it}, \quad (1)$$

where r_t^f is the risk free rate (the return of the Bund) and r_t^m is the market return. SMB_t (Small minus big), HML_t (High minus low), WML_t (Winners minus losers) are market or performance factors provided by Brückner et al. (2015), and ε_{it} is the error term. Our estimation window spans two years of data ending six month before the event month.

We next regress firms' abnormal returns on an interaction term between the event time and the prevailing tax rate at each firm's headquarter location, and on different sets of fixed effects,

$$AR_{it} = \gamma_t + \gamma_I + \gamma\tau_{i2007} + \gamma_D D * \tau_{i2007} + \epsilon_{it}, \quad (2)$$

where AR_{it} are the abnormal returns of firm i in month t, γ_t are month fixed effects, including the event month, γ_I are industry fixed effects, τ_{i2007} is the 2007 LBT rate, D indicates the event time dummy, γ_D is the coefficient of interest, and ϵ_{it} is the error term. We also consider a specification where the industry dummies are interacted with the month-fixed effects, including the event month. We estimate these models over a symmetric event window of five months before and five months after April 2007. Additionally, we also estimate placebo regressions with the other 10 months as alternative event times.

Similar to other financial event market studies such as Cutler (1988), Wagner et al. (2018) and many others, our identification can be regarded as being based on the interaction of an exogenous event with some given characteristics at the firm level, which in our case is the LBT rate faced by each firm at its headquarter. The latter may be regarded as differences in the treatment intensity at the event time. Alternatively, the differences in treatment intensity may be seen as arising from potential differences in tax reductions at the local level due to the design of the reform. Furthermore, since the reform was decided at the federal level, the event time coincided for all firms, and the resulting differential effects caused by local taxation can be largely seen as exogenous. Thus, focusing on the local tax rates in 2007 allows us to identify the differential incidence effects across firms induced by the tax reform decision.

As a complementary approach, we analyze cumulative abnormal returns over the entire reform period. The cumulative abnormal returns are again generated from a Carhart four factor specification, estimated with two years of data, ending six months before March 12, 2007. For each firm we cumulate daily abnormal returns from March 12, 2007 to July 6, 2007. We then regress the cross-section on the local 2007 tax rates

$$CAR_i = \phi_0 + \phi_1\tau_{i2007} + \varepsilon_i, \quad (3)$$

where CAR_i are cumulative abnormal returns, ϕ_0 is the potentially industry-specific intercept, ϕ_1 our parameter of interest, and ε_i is the error term.

4. Results

The first four columns of Table 1 present regression results of Eq. (2) with different sets of fixed effects. In all specifications, the interaction term is positive and statistically significant. Higher local tax rates imply substantially higher returns during the reform period. For each percentage point increase in the local tax rate, firms enjoyed a higher monthly abnormal return of 0.4 percentage points during April 2007 when the tax reform was decided.

Given the dispersion of local tax rates across headquarter locations, these differences are quantitatively sizable. To see this, we can use the 75%-quantile of the local tax rate and the 25%-quantile to define a "high-tax" and a "low-tax" jurisdiction, respectively. The difference in the local tax rates between them is equal to 2.84 percentage points. Therefore, the estimate implies that the abnormal return for a firm residing at the high-tax jurisdiction is about 1.13 percentage points higher compared to a firm headquartered at the low-tax jurisdiction. The average monthly stock return for the German market's top segment is about 1.6% over the three years 2004, 2005 and 2006, see Stehle and Schmidt (2015).[6] Thus, the higher abnormal return of 1.13 percentage points translates into a 66% increase in the average monthly return. Thus, the government's decision to legislate the reform brought substantially higher benefits for firms residing at high tax jurisdictions relative to their counterparts with headquarters at low tax locations over the course of April 2007.

A potential limitation to our approach is the possibility that our results are not driven by the tax rate differences themselves, but that they pick-up the effects of unobservable firm-level characteristics which are correlated with the LBT rate. While this may be a valid criticism, and applies to all studies that rely on differences in treatment intensity as a function of firm characteristics at a given event time, we believe that it should not apply here. The majority of the industry-times-event-time-effects included in Column (4) in Table 1 are highly significant, which underlines that different sectors were affected differently. However, the estimate of our coefficient of interest is hardly affected by the inclusion of industry fixed effects interacted with month fixed effects. This makes it unlikely that our results are driven by unobservable firm characteristics that correlate with the local tax rate.

The results of the placebo regressions displayed in Fig. 3 further corroborate our findings. None of the placebo event coefficients is statistically significant. Only in April 2007 do the LBT rates matter for firms' stock market performance.

Columns (5) and (6) of Table 1 show the results of estimating Eq. (3). Both capture a statistically significant positive impact from the local tax rate onto firms' performance. Thus, even over the entire reform process cumulative abnormal returns are higher for firms based in high-tax jurisdictions. Moreover, the marginal effect of a higher local tax rate is somewhat larger over the extended period. This latter finding is in line with Fig. 2, which also suggests that the divergence between high and low tax firms may not be strictly confined to April 2007.

[6] The average monthly returns are very similar if one alternatively considers the years 2003 to 2005 (1.7%), or the years 2005 to 2007 (1.8%).

Table 1
Regression analysis of monthly abnormal returns.

	(1)	(2)	(3)	(4)	(5)	(6)
τ_{i2007}	0.0318	0.0292	0.0520	0.0539	0.651**	0.675**
	(0.0895)	(0.0904)	(0.0920)	(0.0925)	(0.288)	(0.282)
$D * \tau_{i2007}$	0.429**	0.432**	0.432**	0.424**		
	(0.213)	(0.214)	(0.214)	(0.214)		
N	2068	2068	2068	2068	188	188
Time FE		yes	yes	yes		
Industry FE			yes	yes		yes
Time FE*Industry FE				yes		

Notes: Columns (1)–(4) show estimations of Eq. (2) with various sets of fixed effects. The dependent variables are firms' monthly abnormal returns. Robust standard errors clustered at the municipality level are in parentheses. Columns (5) and (6) show estimations of Eq. (3). The dependent variables are cumulative abnormal returns from March 12, 2007, until July 6, 2007. Robust standard errors are in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

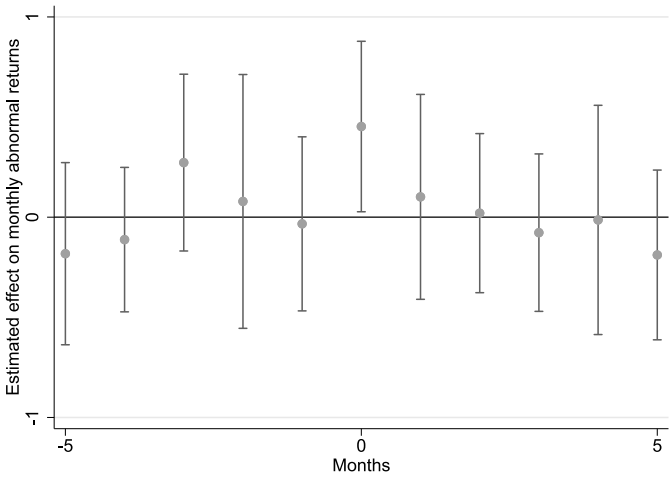


Fig. 3. Placebo estimates
Notes: Estimated interaction effects of the local tax rates with the tax reform month (April 2007), indicated as 0, and with the placebo months. The graph illustrates the point estimates together with their 95% confidence intervals. All regressions include time and industry fixed effects. Standard errors are clustered at the municipality level.

5. Discussion and conclusion

The differential reaction of firm valuations as a function of the local tax rate indicates that firm owners at least partially bear the burden of local corporate taxes. Moreover, the effects are quantitatively important. A higher local tax rate of one percentage point resulted in an increase by roughly 0.4 percentage points of the monthly return of individual firms during April 2007. The cross section over the entire reform period even indicates a higher return of nearly 0.7 percentage points.

Our result that firms based in high tax locations benefited relatively more parallels findings of Wagner et al. (2018), who also find that firms with high effective tax rates benefited relatively more from the expected corporate tax reduction after the unexpected win of the 2016 United States' election by Donald Trump and the Republican Party. Similarly, Kalcheva et al. (2020) and Wagner et al. (2020) find that the value of firms with higher effective tax rates reacted more strongly to the US Tax Cut and Jobs Act (TCJA) which also lowered corporate tax rates, on average.

The fact that firm owners bear part of local corporate taxes leads to the question who these owners are. Foreign ownership in the German stock market is rather high and has been increasing over recent years. At the time of our study, foreign ownership weighted by market capitalization in the entire German stock market was 53.6%.[7] This implies that an important part of the burden of local corporate taxes in Germany is shifted to foreign residents.

Conceptually, our result that high tax firms substantially outperform low tax firms in response to the tax reform decision can be interpreted along several lines. One explanation may be that the base-broadening measures of the reform were actually overcompensated by those elements that shrank the tax base, since a base reduction favors firms facing higher local tax rates. This explanation, however, is not supported by various evaluations, who rather judged the 2008 German tax reform as a rate-cut-cum-base-broadening reform, see Homburg (2007) or Finke et al. (2013), for example.

Another, more likely explanation should be that mostly uniform tax rate reductions have stronger positive effects on high tax firms. First, such firms may be more profitable. Second, they have stronger tax avoidance incentives and thus larger hidden reserves, implying larger benefits from a tax reduction. Finally, given the higher tax burden, their set of profitable marginal investments may increase substantially more.[8]

Our findings are in line with Fuest et al. (2018) who show that approximately 50% of the LBT burden are born by workers, so that capital owners may, in principle, bear the remaining burden in part or in full. Our results are also compatible with the recent study by Link et al. (2022) who find that increases in the LBT rate lead to downward revisions of planned investments by firms. This corresponds to our assessment that such taxes can negatively affect the returns of existing capital and reduce the set of profitable future investment opportunities. Similarly, Lichter et al. (2022) analyze the effects of the LBT on firms' R&D activities and estimate an elasticity of R&D expenditures with respect to the LBT rate of −1.15. Thus, profitable R&D activities are also negatively impacted, which is also fully compatible with our findings that the LBT rate impacts firm value. Finally, our results are also in agreement with Suarez Serrato and Zidar (2016) who find that, in the US, firm owners partially bear the burden of state corporate taxes. Our analysis shows that, in Germany, firm owners are even affected by corporate taxes at the local level. Future research beyond the scope of our analysis could investigate in more detail, how firm characteristics additionally interact with local corporate taxes and determine their incidence.

[7] Foreign ownership of total market capitalization was 53.6% at year end 2006 and 58.8% at year end 2007 (Bundesbank, 2014).

[8] The latter point is reflected in standard theoretical frameworks of distortionary corporate taxation. In such models the size of the marginal adjustment of firms' optimal capital stock (in absolute value) to an increase in the tax rate is typically an increasing function of the prevailing tax rate. As is economically intuitive, the marginal distortion is increasing in the tax rate.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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